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BIOLOGICAL EVALUATION OF SOUTHERN PINE BEETLE ON THE ANGELINA, NECHES, RAVEN, SAN JACINTO, TENAHA, AND YELLOWPINE RANGER DISTRICTS ON THE NATIONAL FORESTS IN TEXAS

by

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Abstract

A biological evaluation of southern pine beetle (SPB) infestations was conducted on the Angelina, Neches, Raven, San Jacinto, Tenaha and Yellowpine Districts on the National Forests in Texas. During the period of 20 August to 18 September, 1984, these districts had 805 active SPB spots; 361,368 acres of susceptible host type in the outbreak area. Forest Pest Management recommends that the current SPB control project be renewed for FY 1985 and that each district continue to prioritize and control SPB infestations as quickly as possible.

INTRODUCTION

A biological evaluation was conducted on the National Forests in Texas (Fig. 1) to determine the status of the southern pine beetle (Dendroctonus frontalis Zimm.) populations. The following Ranger Districts were evaluated: Angelina, Neches, Raven, San Jacinto, Tenaha and Yellowpine Ranger Districts. Entomologists from Forest Pest Management (FPM), Pineville, LA, Field Office conducted the evaluation from 20 August to 18 September, 1984.

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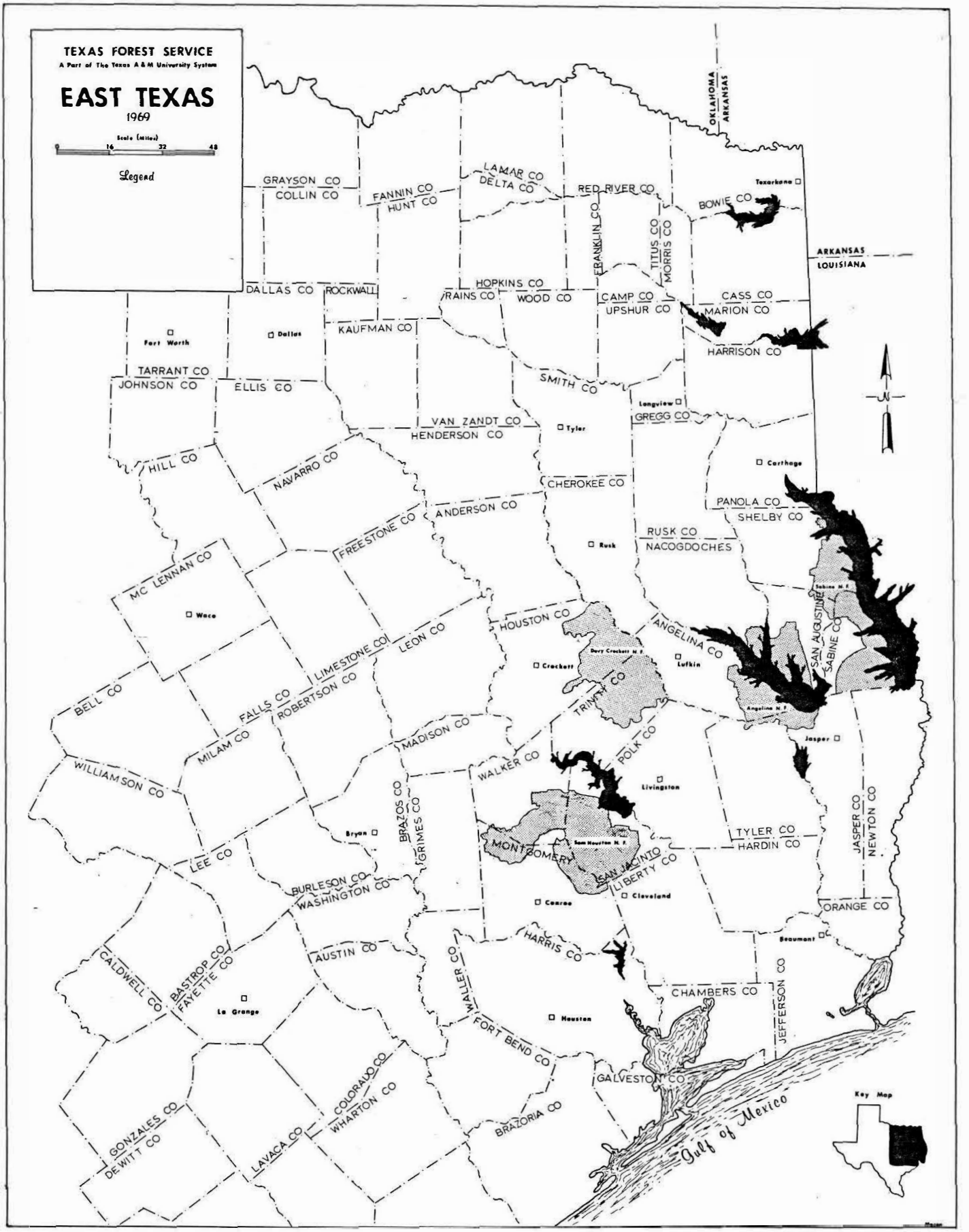
Figure 1. National Forests in East Texas.


TEXAS FOREST SERVICE
A Part of The Texas A & M University System
EAST TEXAS
1969
Scale (Miles)
0 16 32 48
Legend
OKLAHOMA
ARKANSAS
ARKANSAS
LOUISIANA
GRAYSON CO
COLLIN CO
FANNIN CO
HUNT CO
LAMAR CO
DELTA CO
RED RIVER CO
FRANKLIN CO
TITUS CO
MORRIS CO
BOWIE CO
Texarkana
DALLAS CO
ROCKWALL
HOPKINS CO
RAINS CO
WOOD CO
CAMP CO
UPSHUR CO
CASS CO
MARION CO
HARRISON CO
KAUFMAN CO
Fort Worth
Dallas
TARRANT CO
JOHNSON CO
ELLIS CO
SMITH CO
Longview
GREGG CO
VAN ZANDT CO
HENDERSON CO
Tyler
HILL CO
NAVARRO CO
CHEROKEE CO
Carthage
PANOLA CO
SHELBY CO
ANDERSON CO
FREESTONE CO
RUSK CO
NACOGDOCHES
Rusk
MC LENNAN CO
Waco
HOUSTON CO
ANGELINA CO
Davy Crockett N. F.
Crockett
Lufkin
SAN AUGUSTINE CO
SABINE CO
Sabine N. F.
Angelina N. F.
LIMESTONE CO
LEON CO
BELL CO
FALLS CO
ROBERTSON CO
TRINITY CO
MILAM CO
MADISON CO
Jasper
WILLIAMSON CO
WALKER CO
POLK CO
Livingston
BRAZOS CO
GRIMES CO
Bryan
Sam Houston N. F.
MONTGOMERY
SAN JACINTO
LIBERTY CO
TYLER CO
HARDIN CO
JASPER CO
NEWTON CO
LEE CO
BURLESON CO
WASHINGTON CO
Cleveland
Conroe
ORANGE CO
Beaumont
CALDWELL CO
BASTROP CO
FAYETTE CO
AUSTIN CO
HARRIS CO
WALLER CO
La Grange
Houston
CHAMBERS CO
JEFFERSON CO
FORT BEND CO
GALVESTON CO
GONZALES CO
DE WITT CO
LAVACA CO
COLORADO CO
WHARTON CO
BRAZORIA CO
Gulf of Mexico
Key Map

Southern pine beetle infestations have been occurring on the National Forests in Texas since the late 1950's. Since that time, populations have fluctuated between endemic and epidemic levels on various districts. In 1984 there was an increase in the number of SPB infestations on the National Forests in Texas. This increase came after high populations were found on the Raven District in 1983. Other districts had moderate populations in 1983 and these populations increased in FY 1984. High levels of older age, high density timber stands on the affected districts predisposes the National Forest to SPB activity. Eighty-four percent of the high hazard Texas grid blocks are on National Forest land. To date, more than 40 MMBF of timber has been salvaged and approximately 150,000 trees cut-and-left on the National Forests in Texas.

Many beetle spots have been controlled and a large volume of timber protected that would otherwise have been lost. But the occurrance of new, rapidly expanding spots has continued to provide a heavy workload for all districts involved.

TECHNICAL INFORMATION

The southern pine beetle is one of the most destructive insect enemies in the South. It attacks all species of southern pines. On the National Forests in Texas, loblolly pine, Pinus taeda L., and shortleaf pine, Pinus echinata Mill. are preferred hosts. Typically, pines are killed in groups ranging from a few trees to those covering several hundred or even thousands of acres.

Life Cycle of the Insect

Beetle broods complete their development in about a month from April through September (approx. 7 generations/year). The adult beetles attack living trees. Sometimes, thousands of beetles invade individual trees. Each pair of attacking beetles constructs a winding gallery in the inner bark and the female deposits eggs in niches along the sides. The galleries meet and cross one another and girdle the tree.

The eggs hatch into a whitish crescent-shaped larva with a glossy, reddish-brown head. The larvae mine in the inner bark and the corky bark. When fully grown they pupate just below the surface of the corky outer bark.

When pupation is complete the new adults chew exit holes through the bark and invade green trees in the vicinity or fly considerable distances to begin new infestations. A complete description of the biology of the southern pine beetle is available in "Forest Insect and Disease Leaflet 49".

Type of Damage

Damage caused by the southern pine beetle is tree mortality resulting from adult beetles constructing egg galleries in the cambial region of the host tree. Blue staining fungi (Ceratocystis spp.) introduced by the beetles and secondary insects may accelerate tree death by blocking the vascular system of the tree.

METHOD OF EVALUATION AND ANALYSIS OF SPB INFESTATIONS

Aerial Survey and Ground Check

Standard aerial sketch map procedures were used for this evaluation, except survey coverage was 100%. Aerial surveys were conducted by district personnel prior to ground checking and spots of red and/or fading trees were recorded and plotted on Forest Service Class A maps. Sixty-five spots were randomly selected for ground checking.

Numbers of vacated and infested trees, crown color, brood stage, basal area, age, height, DBH, percentage of the stand in sawtimber, and landform were recorded. This information was used to run the benefit/cost analysis and to hazard rate the stands.

Hazard Rating

All the SPB infested stands were hazard rated at the time of ground checking. This is part of FPM's effort to validate SPB hazard rating systems whenever the opportunity exists. The system used was developed on the Kisatchie National Forest by Dr. Peter Lorio of the Southern Forest Experiment Station (Lorio and Sommers 1981). It is designed for use by the National Forests in Region 8 and utilizes field data collected by the prescriptionist during the field procedure (FSH 2409.21d R8 Kisatchie National Forest Supplement No. 7). Due to the similar nature of the forest conditions between central Louisiana and east Texas, we feel that this hazard rating system should accurately reflect host/site/stand characteristics associated with SPB attack on the National Forests in Texas.

Suppression Project Criteria

Decisions to initiate a SPB suppression project were based on the following criteria:

- Number of SPB spots per 1,000 acres of susceptible host type.

  This figure provides an indication of current levels of SPB activity. One multiple tree spot/1000 acres of susceptible host type has historically been considered the lower threshold of a SPB epidemic. To determine the number of acres of susceptible host type, the Continuous Inventory of Stand Conditions (CISC) data for the National Forests in Texas was used. The number of acres of shortleaf-oak, loblolly-hardwood, longleaf, slash, loblolly, shortleaf, and bottomland and hardwood-yellow pine were determined (forest type codes 12, 13, 21, 22, 31, and 32 and 46. Regeneration, seedling-sapling and sparse stand acreage was subtracted from the total as these areas have little chance of sustaining large losses to SPB.

- Green tree:red tree ratio.

  This ratio, based on the number of green infested trees to the number of red and fading infested trees, provides an indication of how rapidly a SPB spot is expanding at the time of ground check

- Volume of timber currently infested and economic evaluation.

  The volume of timber currently infested is calculated from the ground checked SPB spots. The currently infested volume is used in the Southern Pine Beetle Economic Evaluation Program (SPBEEP) to develop the economic benefit cost ratio, internal rate of return, targets for timber removed, and the volume of timber protected by control efforts. As the volume of timber currently infested with SPB increases, the economic benefits from a SPB suppression project also increase.

- Entomological judgment.

  Professional experience and field observations from the ground checked spots are used to interpret and supplement the technical data to reach a final decision.

RESULTS AND DISCUSSION

A total of 805 active multiple tree SPB infestations were present on the districts at the time of the ground checks. Sixty-five SPB infestations were ground checked by FPM during the evaluation and the data are summarized in Tables 1-6. Infestations that were ground checked ranged in size from 4 to 1,150 trees. The mean ratio of green infested:red infested trees was 9.67:1. Most of the spots were expanding and contained many trees with fresh attacks. Also, new SPB spots were still being found at the time of this evaluation that had been initiated during or after July, 1984. This was evidenced by the fact that 10 of the SPB spots that were ground checked had no vacated trees associated with them. There was a total of 361,368 acres of susceptible host type for the six districts which were evaluated. There was a mean of 2.2 spots per 1000 acres of susceptible host type.

Trend

Fifty-eight of the 65 spots ground checked were predicted to have additional timber losses during the next 30 day period Tables 1-6. The range of predicted spot growth is from 0-405 trees. The mean number of infested trees per spot has increased from 42.1 at the time of the FY 1984 biological evaluation to 79.5 at the time of this evaluation. This fact, plus the high ratio of green to red infested trees indicate that the SPB will continue at an epidemic rate through FY 1985.

Ecnomoic Analysis

The estimated volume of trees currently infested is 19.5 MMBF. If the SPB suppression project is renewed for FY 1985, it is estimated that 20.92 MMBF would be removed and 43.24 MMBF would be protected. For detailed information on the economic benefits with and without a project, refer to Appendix II.

Intangible benefits, which are not included in this benefit/cost analysis includes the loss of habitat and potential habitat for the red cockaded woodpecker. Prime habitat for the red cockaded woodpecker is also high hazard SPB timber and if SPB populations remain epidemic, much of the red

cockaded woodpecker habitat will be lost. The benefits reported here result from calculations based on the timber resource only and the values of timber salvaged, lost or protected due to project action or inaction.

Hazard Rating

A hazard rating was done for each timber stand where the SPB infestations were ground checked. Thirty-two stands were in the high hazard classification, 30 in the medium classification and 3 in the low classification. The hazard rating system developed by Lorio and Sommers (1981) was used to hazard rate the stands. Spots in high hazard stands have the greatest potential for timber loss and when feasible, should be controlled first. When populations reach the level that now exists in Texas, all southern pine timber is susceptible to being attacked. Many plantations which are not merchantable or marginally merchantable are infested at this time. The economic loss where these plantations are infested exceeds that of natural stands since the expense of site preparation and planting must be born before the crop has reached rotation age.

RECOMMENDATIONS

Based on the increased size and number of spots, and the predicted spot growth, FPM anticipates a continued SPB epidemic on the National Forests in Texas. The present level of SPB activity on the Angelina, Neches, Raven, San Jacinto, Tenaha and Yellowpine Districts indicate that a SPB suppression project for these districts is justified.

Appendix II describes a complete list of control alternatives for SPB spots.

REFERENCES

Lorio, P.L., Jr.; Sommers, R.A. Use of available resource data to rate stands for southern pine beetle risk. In: Hazard rating systems in forest insect pest management: Symposium proceedings. Gen. Tech. Rep. WO-27. Washington, D.C.: U.S. Department of Agriculture, Forest Service; 1981: 75-78.

Oliveria, F.L. Biological Evaluation of Southern Pine Beetle on the Angelina, Yellowpine, Neches, Trinity, San Jacinto, and Raven Ranger Districts on the National Forests in Texas. Rep. No. 84-2-9. Southern Region, State and Private Forestry, USDA, Forest Service, Atlanta, GA. March 1984. 34 p.

Swain, K.M.; Remion, M.C. Southern Pine Beetle Handbook: Direct control methods for the southern pine beetle. U.S. Department of Agriculture Handbook No. 575. Washington, D.C.: U.S. Department of Agriculture, Combined Forest Pest Research and Development Program; 1980. 15 p.

Thatcher, R.C.; Barry, P.J. Southern Pine Beetle, Forest Insect and Disease Leaflet #49. U.S. Department of Agriculture, Forest Service. October 1982. 7 p.

APPENDIX I

Table 1. Summary of ground check and hazard ratings for the Angelina Ranger District, National Forests in Texas.

Spot No.	Tree Species	Total Trees Killed	Total Trees Infst	Green Infst Trees	Red Infst Trees	Green /Red Ratio	Total Vac. Trees	Pine Basal Area	Total Basal Area	Stand Age	Avg. Tree Ht.	Avg. Tree DBH	SPB Hazard Rating	Add. Trees Killed 30 Days	Merch. Volume Cubic Ft.
1	Shortleaf	88	53	47	6	7.8:1	35	80	110	55	105	18	Medium	29	3657
2	Loblolly	17	17	14	3	4.7:1	0	90	140	50	99	16	Medium	8	847
3	Loblolly	101	81	75	6	12.5:1	20	80	110	57	77	14	Medium	47	2349
4	Loblolly	159	129	127	2	63.5:1	30	100	110	60	86	12	High	79	3122
5	Loblolly	457	257	230	27	8.5:1	200	90	120	40	90	17	Medium	180	14341
6	Loblolly	313	163	144	19	7.6:1	150	110	140	80	110	12	High	132	5591
7	Loblolly	168	143	125	18	6.9:1	25	100	130	80	87	13	High	106	4076
8	Loblolly	9	7	7	0	7.0:0	2	90	110	60	97	15	Medium	0	305
9	Loblolly	19	19	18	1	18.0:1	0	80	130	47	113	20	Medium	8	1725
10	Loblolly	156	86	86	0	86.0:0	70	90	110	49	88	16	Medium	51	3775
Total		1487	955	873	82	130:1	532	910	1210	578	952	153		640	39788
Avg.		148	95	87	8	12:1	53	91	121	57	95	15	High	64	3978

Table 2. Summary of ground check and hazard ratings for the Neches Ranger District, National Forests in Texas.

Spot No.	Tree Species	Total Trees Killed	Total Trees Infst	Green Infst Trees	Red Infst Trees	Green /Red Ratio	Total Vac. Trees	Pine Basal Area	Total Basal Area	Stand Age	Avg. Tree Ht.	Avg. Tree DBH	SPB Hazard Rating	Add. Trees Killed 30 Days	Merch. Volume Cubic Ft.
1	Shortleaf	44	44	41	3	13.7:1	0	100	110	80	102	26.2	High	23	5632
2	Shortleaf	24	24	23	1	23.0:1	0	110	130	12	45	6	Low	12	60
3	Shortleaf	112	72	63	9	7.0:1	40	80	110	75	80	14.9	Medium	41	2398
4	Shortleaf	13	13	10	3	3.3:1	0	90	130	45	91	18.9	Medium	4	806
5	Shortleaf	70	70	68	2	34.0:1	0	60	120	71	85	20	Low	44	4620
6	Shortleaf	6	6	4	2	2.0:1	0	100	140	66	92	14	High	0	228
7	Shortleaf	33	33	32	1	32.0:1	0	120	120	14	40	5	Low	17	53
8	Shortleaf	6	6	5	1	5.0:1	0	80	130	70	88	14	Medium	0	200
9	Shortleaf	4	4	4	0	4.0:0	0	70	100	70	80	16	Medium	0	176
Total		312	272	250	63	120:1	40	810	1090	503	703	135		141	14173
Avg.		34	30	27	4	13:1	4	90	121	55	78	15	Medium	15	1574

Table 3. Summary of ground check and hazard ratings for the Raven Ranger District, National Forests in Texas.

Spot No.	Tree Species	Total Trees Killed	Total Trees Infst	Green Infst Trees	Red Infst Trees	Green /Red Ratio	Total Vac. Trees	Pine Basal Area	Total Basal Area	Stand Age	Avg. Tree Ht.	Avg. Tree DBH	SPB Hazard Rating	Add. Trees Killed 30 Days	Merch. Volume Cubic Ft.
1	Loblolly	153	103	100	3	33.3:1	50	110	140	50	120	22	High	81	11021
2	Loblolly	104	69	65	4	16.2:1	35	130	160	65	83	19	High	60	4168
3	Loblolly	60	34	34	0	34.0:0	26	100	150	50	84	14	High	24	1132
4	Loblolly	1150	850	750	100	7.5:1	300	80	80	63	82	21	Medium	405	61200
5	Loblolly	88	38	31	7	4.4:1	50	120	130	67	108	23	High	23	3990
6	Loblolly	130	70	54	16	3.4:1	60	100	130	52	113	19	Medium	49	5796
7	Loblolly	11	3	2	1	2.0:1	8	100	130	54	84	12	High	0	73
8	Loblolly	210	150	133	17	7.8:1	60	100	110	48	72	11	High	93	2610
9	Loblolly	31	11	5	6	.8:1	20	90	110	56	99	18	Medium	1	682
10	Loblolly	106	73	66	7	9.4:1	33	90	100	72	131	20	Medium	38	6628
Total		2043	1401	1240	161	85:1	642	1020	1240	577	976	179		774	97300
Avg.		204	140	124	16	8:1	64	102	124	57	97	17	High	77	9730

Table 4. Summary of ground check and hazard ratings for the San Jacinto Ranger District, National Forests in Texas.

Spot No.	Tree Species	Total Trees Killed	Total Trees Infst	Green Infst Trees	Red Infst Trees	Green /Red Ratio	Total Vac. Trees	Pine Basal Area	Total Basal Area	Stand Age	Avg. Tree Ht.	Avg. Tree DBH	SPB Hazard Rating	Add. Trees Killed 30 Days	Merch. Volume Cubic Ft.
1	Loblolly	348	148	100	48	2.1:1	200	70	100	60	91	21	Medium	83	12032
2	Loblolly	570	270	230	40	5.7:1	300	130	130	32	56	9	Medium	206	2133
3	Loblolly	184	134	128	6	21.3:1	50	110	110	57	86	13	High	83	3819
4	Loblolly	196	116	101	15	6.7:1	80	90	120	27	72	11	Medium	78	2018
5	Loblolly	141	116	87	29	3.0:1	25	90	140	53	82	11	Medium	92	2343
6	Loblolly	383	233	202	31	6.5:1	150	110	110	53	97	15	High	149	10159
7	Loblolly	56	41	38	3	12.7:1	15	100	110	28	72	9	High	21	463
8	Loblolly	108	28	12	16	.7:1	80	100	100	34	74	10	High	10	400
9	Loblolly	41	11	6	5	1.2:1	30	90	100	61	102	17	Medium	0	684
10	Loblolly	50	35	31	4	7.7:1	15	130	130	47	125	18	High	21	2625
Total		2077	1132	935	197	68:1	945	1110	1177	452	857	134		743	36676
Avg.		207	113	93	19	6:1	94	111	117	45	85	13	High	74	3667

Table 5. Summary of ground check and hazard ratings for the Tenaha Ranger District, National Forests in Texas.

Spot No.	Tree Species	Total Trees Killed	Total Trees Infst	Green Infst Trees	Red Infst Trees	Green /Red Ratio	Total Vac. Trees	Pine Basal Area	Total Basal Area	Stand Age	Avg. Tree Ht.	Avg. Tree DBH	SPB Hazard Rating	Add. Trees Killed 30 Days	Merch. Volume Cubic Ft.
1	Loblolly	66	36	30	6	5.0:1	30	120	140	78	111	19	High	24	2981
2	Loblolly	88	53	45	8	5.6:1	35	140	180	71	106	17	High	51	3297
3	Loblolly	158	58	57	1	57.0:1	100	130	160	67	87	19	High	50	3503
4	Loblolly	113	53	39	14	2.8:1	60	150	180	55	84	11	High	51	1071
5	Loblolly	110	60	57	3	19.0:1	50	170	190	52	97	15	High	62	2616
6	Loblolly	80	40	35	5	7.0:1	40	100	110	67	107	13	Medium	20	1468
7	Loblolly	89	14	10	4	2.5:1	75	150	170	49	116	18	High	8	1050
8	Loblolly	155	55	48	7	6.9:1	100	110	130	51	79	13	High	37	1364
9	Loblolly	82	42	38	4	9.5:1	40	120	150	53	85	15	High	32	1625
10	Loblolly	87	52	52	0	52.2:0	35	170	190	50	99	18	High	53	3224
11	Loblolly	104	54	51	3	17.0:1	50	120	150	54	90	11	High	42	1242
12	Loblolly	97	47	43	4	10.7:1	50	100	120	60	96	11	High	28	1081
13	Loblolly	38	18	18	0	18.0:0	20	140	170	57	87	13	High	12	513
14	Loblolly	261	111	107	4	26.7:1	150	170	180	47	86	10	High	114	1854
Total		1528	693	630	63	170:1	835	1890	2220	811	1330	203		584	26889
Avg.		109	49	45	4	12:1	59	135	158	57	95	14	High	41	1920

Table 6. Summary of ground check and hazard ratings for the Yellowpine Ranger District, National Forests in Texas.

Spot No.	Tree Species	Total Trees Killed	Total Trees Infst	Green Infst Trees	Red Infst Trees	Green /Red Ratio	Total Vac. Trees	Pine Basal Area	Total Basal Area	Stand Age	Avg. Tree Ht.	Avg. Tree DBH	SPB Hazard Rating	Add. Trees Killed 30 Days	Merch. Volume Cubic Ft.
1	Loblolly	66	26	20	6	3.3:1	40	70	100	58	75	14	Medium	9	754
2	Loblolly	72	37	36	1	36.0:1	35	90	140	52	90	15	Medium	25	1613
3	Loblolly	108	78	75	3	25.0:1	30	100	150	50	79	15	High	64	2605
4	Loblolly	138	78	66	12	5.5:1	60	110	160	50	87	16	High	69	3424
5	Loblolly	225	150	137	13	10.5:1	75	80	130	50	98	13	Medium	112	4890
6	Loblolly	65	40	40	0	40.0:0	25	100	140	60	122	21	Medium	27	3956
7	Loblolly	53	23	23	0	23.0:0	30	70	100	56	85	16	Medium	7	1010
8	Loblolly	16	1	1	0	10.0:0	15	120	160	68	75	12	High	0	21
9	Loblolly	56	26	20	6	3.3:1	30	90	100	50	95	17	Medium	9	1451
10	Loblolly	19	14	14	0	14.0:0	5	70	90	65	105	23	Medium	1	1470
11	Loblolly	80	30	30	0	30.0:0	50	80	100	60	90	16	Medium	12	1494
12	Loblolly	178	103	90	13	6.9:1	75	90	130	45	80	13	Medium	75	2936
Total		1076	606	552	54	91:1	470	1070	1500	664	1081	191		410	25624
Avg.		89	50	46	4	7:1	39	89	125	55	90	15	High	34	2135

APPENDIX II

ALTERNATIVES FOR SOUTHERN PINE BEETLE CONTROL

Five alternatives are recommended for southern pine beetle control. The following discussion briefly outlines these alternatives (Swain & Remion 1980). For a more detailed description on conducting control procedures in a southern pine beetle suppression project refer to the Project Control Plan or to the southern pine beetle handbook series (Agric. Hand. Nos. 558, 560, 575, 576).

Alternative 1 - No Action. SPB populations increase periodically. Under this alternative, it is expected that the present SPB infestation would continue to spread and destroy many of the aesthetic characteristics. This may occur over one to several years. If unchecked, the beetles will create large openings of dead snags and scrub brush and greatly reduce the overall pine component. Infestations will likely spread to adjacent areas of both public and private land or serve as epicenters for population expansion. Liabilities for damage could be involved.

Standing snags create a safety hazard to visitors in the area. Violations of the Texas Forest Pest Law may occur.

Alternative 2 - Removal of infested trees and buffer strip of uninfested trees by commercial sales. When infested and buffer strip trees of merchantable size are accessible (skidding distance is a quarter of a mile or less to an existing road), they could be removed by commercial sale. Logging of the infested material should begin immediately. Where needed, a 40 to 125 foot buffer strip will be marked and cut adjacent to and ahead of the most recently infested trees. The order of priority for removing infested timber will be as follows:

a. Trees in the buffer zone. A 40 to 125 foot buffer strip of uninfested green trees around the head of the spot is recommended for removal to minimize reinfestations and to disperse the beetles. The width of buffer zone should be approximately equal to the height of the stand being treated. With weekly monitoring of the spot after control, the buffer strip could be made even smaller or eliminated.

b. Infested green trees. This removes the SPB pheromone source and potential brood.

c. Faders. This removes potential brood.

d. Red-topped. These trees contain living brood during fall and winter and should be removed. It is not necessary to remove these trees during the warmer summer months when developmental rates are much faster.

Alternative 3 - Chemical Control. Chemicals recommended for SPB are Lindane and Dursban. Formulation mixtures are shown on labels. Cut, limb, buck all infested trees into workable lengths. Spray the infested bark surface to the point of run-off. A hand compressed air sprayer is an ideal applicator. Infested logs should be turned three times to insure

complete treatment of infested bark. Spray cut stumps and bark removed by woodpeckers.

The order of priority for cutting and spraying infested trees in large spots is the same as stated in Alternative 2. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts", every effort will be made to locate and treat all green infested trees during the chemical control operation.

Trees from which the brood have emerged will not be sprayed so that natural enemies of the SPB can complete their development.

Alternative 4 - Cut-and-Leave. Cut-and-leave is designed to disrupt spot growth in small to medium-sized spots by dispersing emerging beetles. The following procedure is to be followed when cut-and-leave is applied.

(1) Identify all active trees within the spot.

(2) Fell all active trees toward the center of the spot.

(3) Fell a horseshoe-shaped buffer strip of green, uninfested trees around the most recently attacked trees at the head of the spot and leave them lying on the ground with crowns pointed toward the center of the spot. The buffer should be no wider than the average height of the trees in the spot.

(4) Dead trees from which all SPB have emerged need not be felled. Cut-and-leave treatments, for best results, should be applied during the summer months only (June-October).

In spots > 50 active trees, where cut-and-leave is the only treatment option, cut-and-leave can be administered. Each spot treated must be checked at one week intervals for 4 weeks and treated again, if necessary.

Alternative 5 - Pile-and-Burn. Felling, piling, and thoroughly burning the bark of infested trees is one of the oldest methods of controlling SPB. The entire bark surface must be thoroughly burned to insure effective control. The order of priority for cutting, piling and burning infested trees, particularly in large spots, is the same as stated above under removal of infested trees by commercial sale. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts", every effort will be made to locate and treat all green infested trees during the piling and burning operation. Burning should not be done if it will result in soil erosion.

Selection of one or several of these strategies is possible in the control of SPB infestations. Individual alternatives or combinations of afternatives (2-5) shall be determined on a site by site basis, considering site specific, silvicultural and entomological control constraints.

TEXAS 4% 09/21/84

WITHOUT A PROJECT

AGE	HARV OBJ.	VOLUME LOST (MCF)	SPOT GROWTH RATE	VOLUME THREAT (MCF)	GROWTH RATE (%)	AGE AT HARV.	VOLUME AT HARVEST (MCF)	PRICE AT HARV.	VALUE AT HARVEST	PRESENT VALUE
55	S/F	1006	3.67	3687	.6	70	4038	$ 1579	$ 6374612	$ 3403458
56	S/F	1533	3.68	5639	.6	70	6124	$ 1548	$ 9477853	$ 5262716
TOTAL		2538		9326			10162		$ 15852466	$ 8666173

VALUE OF THE VOLUME NOT SALVAGED (LOST) $ 951892

TOTAL VALUE LOST $ 9618066

WITH A PROJECT

AGE	HARV OBJ.	VOLUME LOST (MCF)	SPOT GROWTH RATE	VOLUME THREAT (MCF)	GROWTH RATE (%)	AGE AT HARV.	VOLUME AT HARVEST (MCF)	PRICE AT HARV.	VALUE AT HARVEST	PRESENT VALUE
55	S/F	309	3.67	1134	.6	70	1242	$ 1579	$ 1961419	$ 1047218
56	S/F	472	3.68	1735	.6	70	1884	$ 1548	$ 2916263	$ 1619297
TOTAL		781		2870			3127		$ 4877682	$ 2666515

VALUE OF THE VOLUME NOT SALVAGED (LOST) $ 292890

TOTAL VALUE LOST $ 2959405

PROJECT BENEFITS:	6658661
TOTAL PROJECT COST:	1291730
NET PRESENT VALUE:	5366931
BENEFIT COST RATIO:	5.15
INTERNAL RATE OF RETURN:	N.C.
COMPOSITE RATE OF RETURN:	15.22%
TARGETS	
VOLUME REMOVED:	3124
VOLUME PROTECTED:	6456

WITHOUT A PROJECT

AGE	HARV OBJ.	VOLUME LOST (MCF)	SPOT GROWTH RATE	VOLUME THREAT (MCF)	GROWTH RATE (%)	AGE AT HARV.	VOLUME AT HARVEST (MCF)	PRICE AT HARV.	VALUE AT HARVEST	PRESENT VALUE
55	S/F	1006	3.67	3687	.6	70	4038	$ 1579	$ 6374612	$ 1387301
56	S/F	1533	3.68	5639	.6	70	6124	$ 1548	$ 9477853	$ 2268923
TOTAL		2538		9326			10162		$ 15852466	$ 3656224

VALUE OF THE VOLUME NOT SALVAGED (LOST) $ 951892

TOTAL VALUE LOST $ 4608117

WITH A PROJECT

AGE	HARV OBJ.	VOLUME LOST (MCF)	SPOT GROWTH RATE	VOLUME THREAT (MCF)	GROWTH RATE (%)	AGE AT HARV.	VOLUME AT HARVEST (MCF)	PRICE AT HARV.	VALUE AT HARVEST	PRESENT VALUE
55	S/F	309	3.67	1134	.6	70	1242	$ 1579	$ 1961419	$ 426862
56	S/F	472	3.68	1735	.6	70	1884	$ 1548	$ 2916263	$ 698130
TOTAL		781		2870			3127		$ 4877682	$ 1124992

VALUE OF THE VOLUME NOT SALVAGED (LOST) $ 292890

TOTAL VALUE LOST $ 1417882

PROJECT BENEFITS:	3190235
TOTAL PROJECT COST:	1291730
NET PRESENT VALUE:	1898505
BENEFIT COST RATIO:	2.47
INTERNAL RATE OF RETURN:	N.C.
COMPOSITE RATE OF RETURN:	16.40%
TARGETS	
VOLUME REMOVED:	3124
VOLUME PROTECTED:	6456

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ALEXANDRIA FIELD OFFICE SEPTEMBER 1984

BIOLOGICAL EVALUATION OF SOUTHERN PINE BEETLE ON THE ANGELINA, NECHES, RAVEN, SAN JACINTO, TENAHA AND YELLOWPINE RANGER DISTRICTS ON THE NATIONAL FORESTS IN TEXAS

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